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PROJECT MT-15/90-PLAN MONTANA 15-90 CORRIDOR INTEROPERABILITY COMMUNICATIONS CONSORTIUM PUBLIC SAFETY MOBILE RADIO PLAN

1.0 INTRODUCTION AND ISSUES

Four counties In Montana (Anaconda-Deer Lodge, Beaverhead, Butte-Silver Bow and Granite) have formed the 15-90 Corridor Interoperable Communications Consortium (the Consortium) to conduct a needs assessment of the current communication environment and develop and implementation strategy for interoperable communications. This program will allow consortium members to move forward towards interoperable communications, recognizing that no one member would have the resources to do so on its own.

Federal Engineering understands that any new public safety mobile radio (PSMR) network for the Consortium should be designed to deliver superior functionality, reliability, coverage, capacity, serviceability, and cost effectiveness. We understand that the Consortium is looking to enhance the performance, interoperability, and scalability in a new generation public safety wireless network that will meet the Consortium's growing demands, future missions and expanding responsibilities. We understand that the Consortium expects to receive a systems plan for PSMR with the following characteristics:

- A design built upon existing public safety communications infrastructures
- A plan which identifies and addresses the needs of all relevant public safety communications users from each of the participating counties collectively and individually.
- A design that accommodates expansion plans for all relevant user groups in the network

- A design which integrates communications among all relevant user groups
- A system which is based upon current Federal and State communication standards (Office of Domestic Preparedness, State Interoperability Executive Council and APCO Project 25)
- A plan that meets the technical, schedule and other requirements of state funding sources including the SIEC (State Interoperability Executive Council), Montana DES (Disaster Emergency Services), and the Montana Public Safety Services Office
- A plan in the VHF frequency band which allows interoperability with existing systems at the local, county, and State level as well as with the SWIP (Southwest Interoperability Project) and the Missoula Interoperability Consortium.
- An infrastructure that will operate as a day-to-day communications network

In our experience, the appropriate system technology follows from a user-driven approach to system design. *FE's* approach will, therefore, be based heavily upon the assessment of user needs and reactions as more fully described in subsequent paragraphs of this Section.

2.0 OUR UNDERSTANDING OF THE PROJECT

Federal Engineering's extensive experience in working with public safety communications systems has lead to the following observations:

- Many existing systems consist of equipment that has been in service for 10 years or more. These systems no longer meet user requirements and, in some cases, spare parts are no longer available.
- Many systems do not provide the level of interoperability that is required today, let alone meeting the expanded requirements that the Homeland Security initiatives demand. The implementation of more recent technology features, such as trunking and digital transmission, further exacerbates interoperability efforts.
- As the focus in the past has been on "local" planning and funding, some adjoining agencies/municipalities have implemented systems that operate in different frequency bands using incompatible technologies from competing vendors. In many cases, these systems are moving farther away from the goal of interoperability. We have seen areas where interoperability was never a problem finding themselves in the situation where several agencies have spent millions of dollars on non-compatible solutions.

- The expanded use of public safety systems to accommodate ever increasing voice traffic as well as mobile data communications is causing the need for additional channels to accelerate in most areas. Additional capacity is difficult to achieve in certain areas as a result of the shortage of frequencies in existing public safety bands. These hampered expansion efforts have resulted in an increased amount of congestion which impacts the ability of public safety organizations to fulfill their critical missions.
- Coverage has always been an issue in both rural and urban environments. To achieve coverage goals, more investment is needed in infrastructure.
- The degradation characteristics of the newer digital radios as the signal to noise ratio drops are quite different than those of the traditional analog units. Whereas analog gracefully degrades providing understandable audio well into the noise floor, digital “drops off a cliff”. Coverage planning for an upgrade must, therefore take into account not only the frequency band but also the modulation techniques.
- The FCC's "refarming" and other directives regarding the use of certain frequencies is forcing many PSMR users to upgrade their existing systems.
- The possibility of natural disasters or terrorist attacks demands a public safety communications system that can “gracefully degrade” as specific assets are rendered inoperable. In addition to being able to withstand these disasters, the selected system should take into account the added demand particular types of emergencies present along with the growth and expansion of agencies and potential users during such situations.
- Public safety mobile radio infrastructures tend to have long life spans and as such, require plans that can evolve as the needs of the Consortium change over time. Recommendations must be sufficiently robust and must rely upon technologies that can withstand the test of time; technologies that may just be emerging today. On the other hand, the Consortium has immediate needs including additional channel capacity and reducing poor coverage areas. **FE** will develop a plan to minimize short term problems while accommodating the future.
- Many studies that have been completed over the past few years with the same, predictable results, a lack of affordability based upon an approach that calls for an "ideal" system rather than a "practical" system. Inevitably, the cost to implement the recommended system far exceeds the ability to raise funds causing the upgrade process to be put on indefinite hold.

The ability of local governments to keep up with the changes in public safety radio technologies has been difficult, primarily due to the massive investments necessary to replace their outdated systems. Homeland Security initiatives of the Federal Government

are providing an unprecedented level of funding for the upgrade of these local public safety communications systems. The funding process requires local governments to have a current plan in place that addresses the needs of stakeholder agencies, particularly from an interoperability standpoint. The forming of consortiums can effectively overcome the limitations of size for smaller local governments.

Federal Engineering understands that the 15-90 Corridor Interoperable Communications Consortium is taking a proactive role by seeking a qualified independent consultant to assist the Consortium in developing a *Public Safety Mobile Radio Plan*. The objective of this plan is to provide an interoperable wireless system for all participating public safety organizations including:

- ✓ Anaconda-Deer Lodge County
- ✓ Beaverhead County
- ✓ Butte-Silver Bow County
- ✓ Granite County

FE further understands that the Consortium envisions a public safety radio system that will achieve the following goals:

- Improve radio communications for participating Consortium public safety radio users.
- Improve Consortium wide radio coverage, relieve channel congestion, and provide interoperable radio services.
- Develop partnerships to use existing and new facilities and a plan to build a modern wireless communications system that will achieve improved interoperability and will reduce the overall cost to Consortium's users. A side benefit will be to replace aging equipment and obsolete technologies.
- Meet the SAFECOM (formerly PSWN) goal of "seamless, coordinated and integrated public safety communications for the safe, effective, and efficient protection of life and property".

Virtually no county or local government has the funding in place to accomplish all of its envisioned public safety communications goals. A phased or ongoing stream of funding is more typical; some from local sources such as bonds, some from Montana State sources, and some from COPS grants, DHS ODP grants, congressional set-asides, and other Federal sources. Federal Engineering understands that a practical plan must take ongoing funding into consideration and be capable of implementation on a phased basis.

During the system planning phase of the program, **FE** will work with the Consortium Project Manager to develop an understanding of the amount of funding already in place, grants approved, grants applied for, and other funding sources being actively pursued by the 15-90 Consortium in order to match the system planning to the funding stream.

3.0 PHASE I - ANALYSES AND RECOMMENDATIONS

3.1 Program Management Office

The first step in this program is the development of a detailed program plan to manage this project for the Consortium. A Program Office will be established to track and report the efforts of the **FE** as well as all relevant agencies and stakeholders. This Program Office will remain in place and coordinate all project activities through all phases.

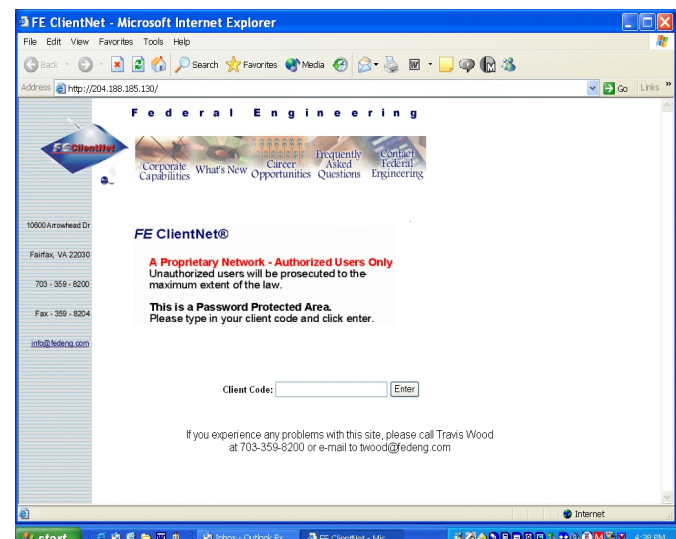
A high level task-based schedule will be developed to ensure that the process is managed and completed within the desired time frames. The process will be outlined in a way that ensures that the results will meet the Consortium's requirements.

The overall plan will incorporate methodologies for ensuring that the project is managed on schedule and within the desired cost structure, with key checkpoints along the way to provide opportunities for review by the Consortium. Status information will be incorporated into automated systems and presented at periodic executive, planning, and working level meetings. **FE** will employ multi-level tracking systems that tailor the status information to the specific needs of each level (i.e., summary information at the executive level and detailed information at the working level).

FE will select from proven automated program management tools as needed including:

- work breakdown structure including tasks, deliverables, and metrics
- Gantt charts
- PERT charts
- critical path analyses
- personnel and contractor assignments
- resource tracking
- financial tracking
- exception reporting

FE makes extensive use of **FEClientNet**, a productivity enhancement tool, for the mutual benefit of our clients and professional staff. **FEClientNet** is an Internet information resource for timely exchanges between client and consultant and among the engagement staff for internal communications. **FEClientNet** facilitates web-enabled program management through a broad range of capabilities including real-time reporting of status and information, a repository for program documents, and a



rapid and efficient method of collecting information. This state-of-the-art methodology removes the uncertainty between client and consultant as to the actual progress being made and the value of the engagement. **FE**'s password-protected system of web pages will be made available to the Consortium at no additional cost. **FE** will work with the Consortium members to establish a link from each of their intranets to **FEClientNet** to facilitate easy access by the participating organizations.

FEClientNet will be used in conjunction with Microsoft Project software to facilitate a broad range of capabilities. The **FE** Program Manager will work with the Consortium's Program Manager, as shown in Exhibit 1, to jointly determine the categories of information to be posted and maintained on the system. **FEClientNet** will then be customized to meet the needs of the Consortium program. Multiple web sites will be used for hierarchical reporting targeted to specific audiences in the Consortium.

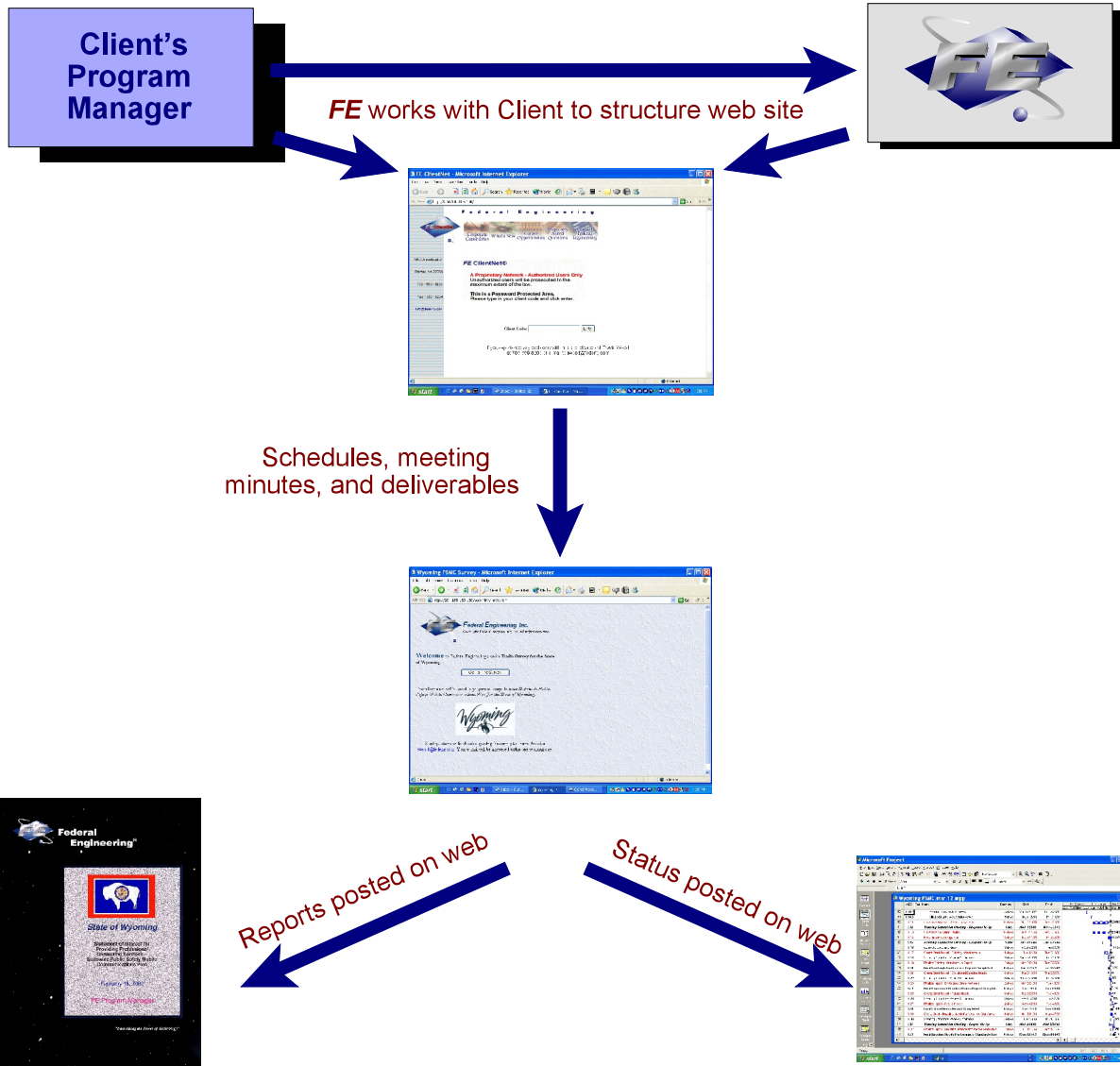
Federal Engineering understands the importance of a close working relationship with our clients especially considering our client bases extends over 40 states. **FEClientNet** is just one of a wide range of communications facilities put in place to promote real-time interaction with our clients. Federal Engineering will make use of these communications systems to deliver status reports in electronic form. Each such report will address the specific accomplishments achieved during the reporting period, including task completion dates, and projected completion dates for the remaining tasks. Topics to be covered for such reports typically include:

- Overview
- Task Objectives
- **FE** Accomplishments
- Difficulties Encountered
- Anticipated Project Changes
- Consortium Actions
- Scheduled Tasks
- Task Completion Status
- Current Milestone Schedule
- Meetings and Trips
- Invoice Payment Status

FE will deliver these status reports in electronic form via email attachments and can also make them available via **FEClientNet**.

Exhibit 1

FEClientNet Program Management



3.2 Program Organization

Federal Engineering's proposed program organization, shown in Exhibit 2, is composed of our most senior talent in the area of public safety mobile radio. This proven team has worked closely together on many **FE** public safety mobile radio projects and most have actually served in the field of public safety. For example:

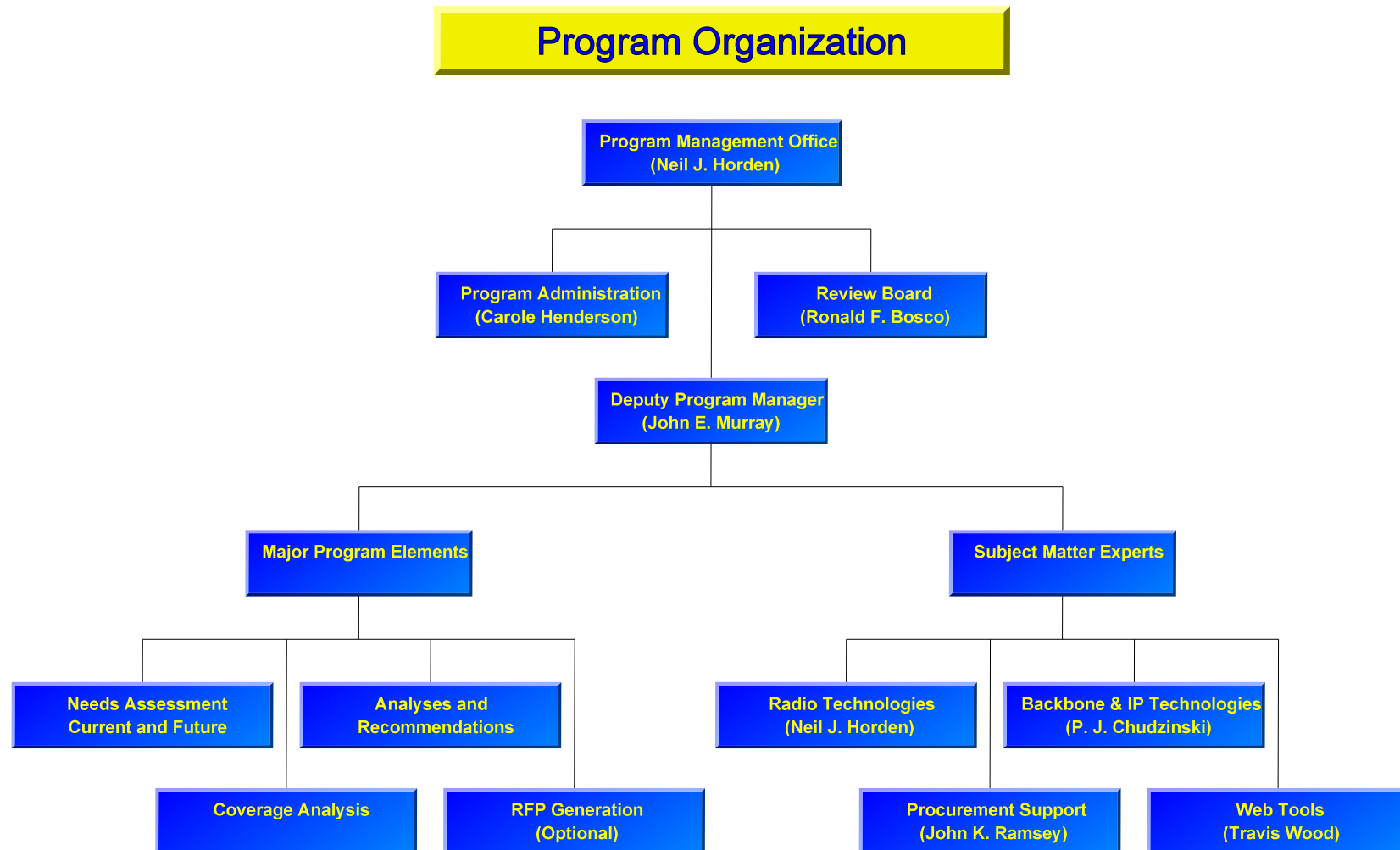
- ▶ Mr. Bosco served as a sworn officer on a suburban police force and understands, first hand, the importance of reliable mobile communications.
- ▶ Mr. Murray has extensive experience as a member of several large municipal Emergency Medical Services teams.
- ▶ Mr. Horden has also served as a member of a municipal Emergency Medical Services team.
- ▶ Mr. Chudzinski has considerable experience as the captain of a Fire Department in a municipality located within the Capital District of Albany, NY.

Based upon his unique combination of technical and managerial skills, Mr. Neil J. Horden, Senior Consultant, will serve as the Program Manager. Mr. Horden served as a technical specialist for a leading PSMR equipment manufacturer, business manager for a cellular company, and telecommunications engineer for Orange County, California. He is currently very active in **FE's** ongoing Montana program and is program manager for both the NTIP and SWIP programs. His unique background brings manufacturer, government, and Montana perspectives to this engagement.

As Program Manager, Mr. Horden will draw from a wide range of **FE** subject matter experts to meet the needs of the Consortium (see Exhibit 2). His 's major responsibilities will include:

- Planning the Overall Program
 - Schedule
 - Budget
 - Resources
- Coordination of Activities
 - Requirements analysis
 - Infrastructure analyses
 - Architectural design
 - Development of Plan
 - RFP generation
 - Independent validation and verification

Exhibit 2



- Monitoring of Progress
 - Milestone schedule
 - Budget
 - Resources
- Quality Assurance
 - Work in progress
 - **FE** reports
- Client Satisfaction

Mr. John E. Murray, Senior Vice President, will serve as the Deputy Program Manager. Mr. Murray has been involved in virtually every recent **FE** public safety mobile radio project either as program manager or deputy program manager. His participation will ensure that this important project for the 15-90 Consortium receives the highest level of attention within Federal Engineering.

Mr. Ronald F. Bosco, President and Founder of Federal Engineering will chair the Review Board for this program. Mr. Bosco's 30+ years of technical experience spans hundreds of **FE**'s state government projects for the states of Alabama, Georgia, Hawaii, Indiana, Kentucky, Louisiana, Maryland, Michigan, Missouri, Montana, Nebraska, Nevada, New Mexico, New York, North Dakota, South Dakota, Ohio, Pennsylvania, Tennessee, Utah, Vermont, Virginia, Wisconsin, and Wyoming. His involvement in this program will ensure that the Consortium receives the highest value for its investment in consulting services.

3.3 Quality Assurance

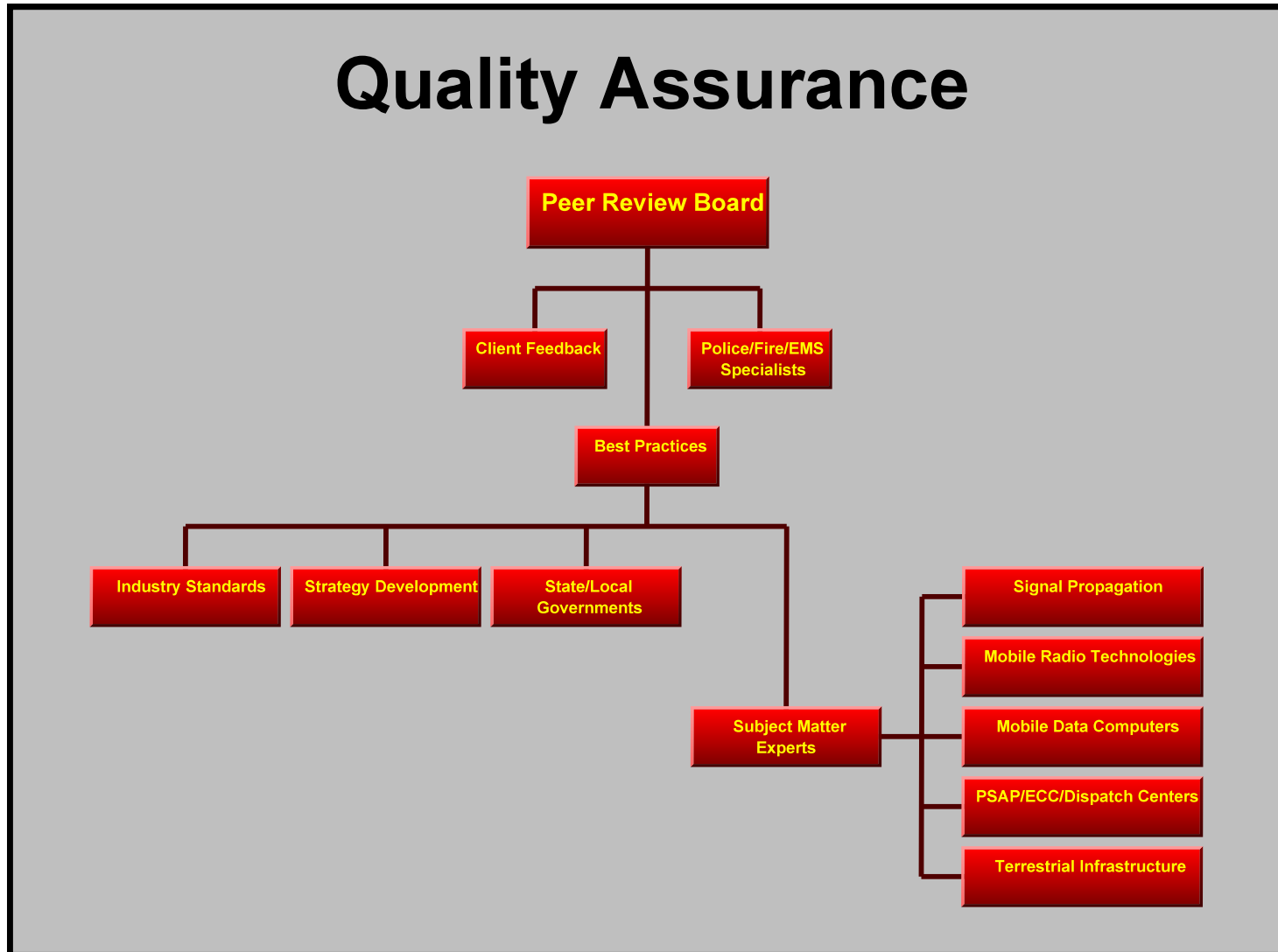
Federal Engineering strives to consistently deliver the highest quality work possible. Our goal is to encourage a long-term relationship with our clients as demonstrated by the following sampling:

- Montana – 1985 to the present
- Wyoming – 1986 to the present
- North Dakota – 1987 to the present
- Tennessee/Nashville – 1989 to the present

This level of longevity is based upon consistent performance, mutual trust, and meeting or exceeding our clients' expectations.

FE employs a peer review process (see Exhibit 3) to ensure the quality of our work. A Peer Review Board is constituted made up of individuals with skill sets unique to the program. Members of this board are not, typically, involved in the day-to-day aspects of the program but rather serve in a "red team" capacity challenging the program team and ensuring that all decisions have been well thought out. Periodic technical reviews are conducted

Exhibit 3



throughout the duration of the program and deliverables evaluated before transmittal to the client. This methodology ensures that **FE** clients receive the best value for their investment in consulting services.

3.4 Program Orientation Meeting

Federal Engineering will conduct a program orientation meeting with representatives from public safety user organizations. The purpose of this meeting will be to introduce the **FE** program team, review project objectives and key milestone dates, identify the relevant agencies and stakeholders and/or the key personnel who will participate, organize project logistics, outline expected deliverables, review status reporting methodologies (including **FEClientNet**), and resolve any other issues that may arise. In addition, **FE** will go over the list of required information to be distributed to all participants requesting information regarding the current infrastructure. It is also anticipated that the Consortium will introduce its Program Manager for the project at this meeting.

As a result of this meeting, **FE** will deliver a revised project plan and timetable. This project plan will serve as the guiding document throughout the program.

3.5 Needs Analysis

FE understands that the focus of this task is the collection, compilation and analysis of key information obtained from a broad spectrum of public safety wireless systems users and that maximum effectiveness must be made of the time spent with each interview subject. **FE** will conduct up to twenty-two (22) interviews, in both focus group and individual settings, with key decision makers and public safety radio system users as follows:

- Anaconda-Deer Lodge County
 - 4 group interviews
- Beaverhead County
 - 3 group interviews
- Butte-Silver Bow County
 - 6 group interviews
- Granite County
 - 5 group interviews
- To be determined
 - 4 individual interviews

To facilitate this extensive interview and data collection process, **FE** will prepare advanced correspondence, for the Consortium Project Manager to send to each proposed interview subject to emphasize the need to be prepared and participate in this process. **FE's** proposal assumes that selecting the participants, contacting the interview subjects, distributing materials, scheduling interviews, and interview arrangements (conference rooms or offices) will be performed by the Consortium Project Manager.

FE will develop and submit to the Consortium Project Manager for review, a survey instrument in the form of a communications questionnaire. **FE's** approach will include face-to-face interviews, focus group meetings and, as a last resort, telephone interviews. Interviews are envisioned to last approximately one to two hours each. Detailed notes will be captured by the **FE** interviewers.

It is clear that the 15-90 Consortium does not need a study to put on the shelf. Clearly this program must "hit the mark" and present a compelling need for funding by Montana State and Federal sources. History has taught us that while consolidated regional wireless systems makes sense on both technical and economic grounds, one cannot overlook the human factors if consolidation is to be a success. Diverse groups within a Consortium like 15-90 have different needs. The critical success factors so important to one user group are very likely to be different than those of other groups. As this study incorporates the needs of an extremely broad spectrum of Consortium users, the challenges grow exponentially.

FE believes that early involvement helps to encourage a broader understanding and participation by all stakeholders with the assurance that their issues are being addressed and incorporated into the overall design. Based upon hundreds of local, county, regional, and state government projects, Federal Engineering has extensive experience in creating and facilitating this sense of unity and participation. **FE** appreciates and understands the need for heavy user participation to build consensus in the early stages and to ensure buy-in by the broadest group of participants. Once achieved, this participation must be constantly reinforced through a program of pro-active, robust communications and the opportunity for ongoing dialog between the stakeholders. **FE's** plan will facilitate both of these critical factors.

Federal Engineering's methodology places considerable emphasis upon accurately determining the needs of the Consortium's mobile wireless users and can be summed up as follows:

- work with Consortium Program Manager to identify the participants to be interviewed
- develop a survey instrument and submit it to the Consortium Program Manager for review and approval
- develop materials for the Consortium Program Manager to distribute to the participants to alert them as to the interview meeting, generate enthusiasm, and identify the information that will required so the participant can be fully prepared in advance
- conduct the interviews with one **FE** consultant interacting with the participants while the other takes notes. This dual-consultant approach has proved invaluable in fostering a highly interactive environment while holding the participants' attention

- get back to the participants via telephone and/or email if additional information or clarifications are required

This methodology reflects **FE**'s strong belief that the mobile wireless infrastructure should be user driven, as opposed to technologically driven or politically driven, in order to best serve user needs. To ensure that this goal is achieved, **FE** will carefully analyze the requirements of the relevant agencies and stakeholders to establish a baseline of system capabilities, functionality and services. Common needs will be identified as will those unique to specific organizations. Where needs diverge or conflict, **FE** will use its expertise and experience to recommend potential solutions.

3.6 Review Existing Systems

The starting point of the infrastructure planning and design process is a thorough understanding of present systems, services, and expenditures. Usable facilities that have already been purchased, as well as the present levels of communications demands, must be accurately assessed. **FE** believes in maximizing existing investments. Accordingly, it is very important to assess current systems and their capabilities. Areas of poor performance and inadequate coverage must be identified as well as infrastructure assets that can be shared going into the future. There is clear economic benefit to using existing county and local government sites as well as the existing sites of other organizations if they prove suitable.

FE's PSMR recommendations will rely heavily upon this task and the information provided by the various participants in the interviews described above. Through a series of interviews with the relevant agencies and stakeholders, **FE** will collect the appropriate information required to understand current systems infrastructure and functionality as well as ongoing users needs, expectations and willingness to participate in a Consortium-wide system. **FE** will ensure that inventory, usage, and cost information has been supplied to a level of detail sufficient to support systems planning. Areas that require further research will be brought to the attention of the Consortium. Where information is unavailable, **FE** will make and document appropriate assumptions.

FE will analyze the information gathered from the participants on the various types of voice and data radio equipment including: mobiles, portables, repeaters, control stations, consoles, microwave, maintenance/test equipment, and other important ancillary equipment, including estimated maintenance material expenses, spares inventory, and maintenance records. As a minimum **FE** will seek to compile the make, model, year of manufacture (or approximate age), ownership, general condition of equipment, supplementing these fields (when available) with information such as number of channels, frequency range, capabilities (analog/digital, wide/narrow band, conventional/trunk, encryption, and squelch control), accessories, use location, and part of which radio network. Information on locations that are in the construction phase will also be collected, through coordination with the appropriate Consortium local agencies.

FE will also process information provided by participants describing radio facilities including: maintenance, dispatch centers, backbone links, repeaters, and tower sites. As a minimum **FE** will include wherever possible: responsible entity(ies), shared facilities (with whom), coordinates of location (latitude/longitude), description of the site (to include condition, life expectancy, environmental controls (HVAC), electrical service (commercial), emergency electrical service (generator/fuel type/UPS/runtimes), accessibility, redundancy, use of the facility, whether site is owned or leased (and by whom), whether site is currently in use, security/monitoring (physical/alarms), and tower (type, height, antenna loading - number of antennas and their size (wind loading), location on tower, tower lighting, ground system, and lighting protection). Further, respondents will be asked to identify the agencies with which they communicate and to identify the demographics/patterns of those interactions.

Additional information to be collected from the Consortium participants will include, where available:

- A collection of pertinent traffic data in the form of channel usage and/or congestion reports
- Data regarding FCC licenses for existing (or applied for extensions) low band, VHF, and UHF systems as well as use/applications in the 800 MHz band as well as emerging bands such as 700 MHz.
- Detailed input from key decision makers as to perceived current performance and future directions
- Service requirements anticipated over the current, near term, and long term periods, including locations to be served, traffic density, performance requirements (mobile/portable and in-building coverage), availability, and current and desired service levels
- Impact of new source origination technologies (e.g., mobile data computers, imaging, AVL, etc.).
- Coverage analyses and/or measurements for existing transmitter sites provided by Consortium participants including coverage gaps.
- Stakeholders' interest and opinions about participating in a regional radio system.
- Stakeholders' ideas and concerns about expected operational improvements considering the embedded technology and the funding restrictions that are faced.

FE will conduct a comprehensive review of any documentation provided by the Consortium, including but not limited to previous needs assessments, strategic plans, system designs,

usage reports, existing contracts, equipment and services inventories, internal and consultant studies, cost analyses, vendor proposals, meeting minutes, coverage analyses, and agency documents in order to determine and summarize the status of current and planned mobile communications.

FE will also conduct up to twenty (20) site visits of Consortium radio facilities including dispatch centers, transmitter sites, and repeater towers to develop a general sense of their capabilities. Digital photographs will be taken and notes generated regarding the overall condition of each site.

3.7 Coverage Analysis

Existing coverage and coverage gaps are fairly well known by the Consortium systems users. Federal Engineering will perform an analytical coverage analysis to confirm the findings of the users.

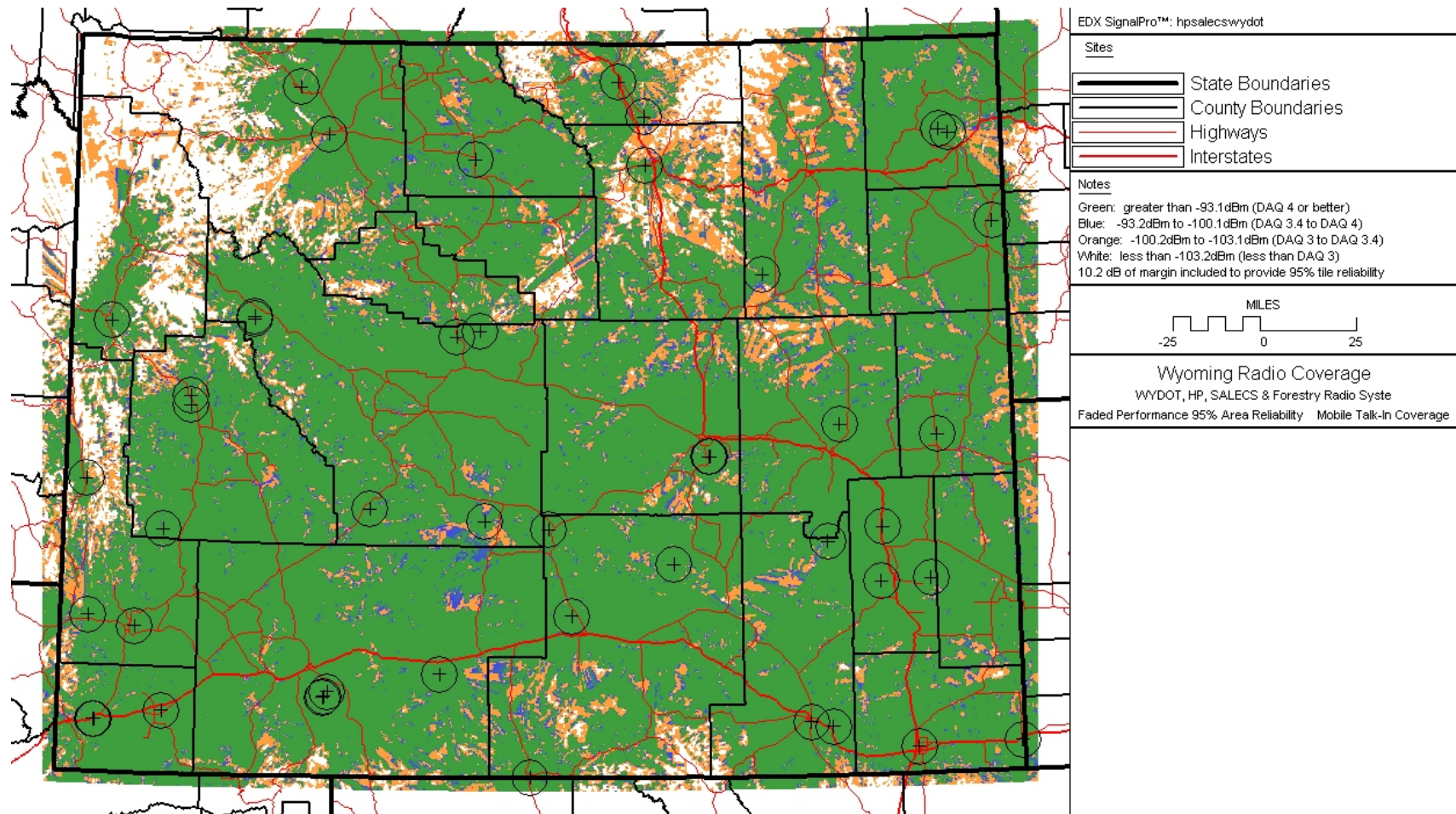
FE will work with Consortium management to develop a coverage goal for the Consortium. Clearly 100% coverage is not possible and once you get above a certain percentage, the resultant systems become impractical from an economic viewpoint. **FE** will apply its vast experience and guide the Consortium in determining the optimum coverage that can be achieved within realistic bounds.

FE will assess the current talk-in coverage of mobile units from existing individual VHF systems and provide coverage maps using appropriate software tools for up to eighteen (18) transmitter locations. Exhibit 4 is an example of a coverage plot recently completed by **FE**. **FE** does not envision modeling portable talk-in and in-building coverage. However, should the Consortium find this necessary, Federal Engineering will adjust its proposal accordingly and work with the Consortium to select one building construction type prior to the initiation of the analysis. These coverage analyses will be based upon the following information to be provided by Consortium participants:

- Decimal Latitude
- Decimal Longitude
- Tower height (HAAT)
- Ground elevation at tower base
- Transmit and Receive Frequencies
- Accurate transmit ERP out of the antenna, or all losses and gains in dBw and the transmitter power in watts
- Receiver sensitivity (incorporating preamplifier gain/noise figures, splitters, and feedline losses)

Exhibit 4

Mobile Talk-In - Specific Sites



- Mobile radio output ERP or all losses and gains in dBw and the mobile transmitter power in watts (only 1 mobile type to be considered)
- Antenna pattern
- Antenna azimuth
- Antenna elevation
- License call sign
- Site name that matches FCC license

It shall be the responsibility of the Consortium to verify the accuracy of the above information prior to delivery to **FE**. The re-entering of data or re-running of computer models due to inaccurate data will be at additional cost.

Specifically, **FE** will perform the following tasks:

- Model setup including data insertion and script generation. Define the study grid and make sure all input data is in the correct format and configuration.
- Perform coverage runs for all individual sites with 500 meter resolution. Talk-in performance will be modeled since it is typically the best indication of where marginal performance exists.
- Generate output maps.

Initially, **FE** will analyze the coverage requirements. Areas to be addressed will include: what frequencies are available and may be used, what is the area that must be covered, what FCC requirements must be met, what QoS (quality of service) is required, what margins are necessary, what towers are available, what is the largest coverage hole permitted? A system solution will then be developed utilizing existing and new equipment that is expected to meet the requirements and another coverage analysis run on the new system. At the conclusion of this task, **FE** will deliver hard copy of each coverage plot.

3.8 Systems Recommendations

FE will incorporate the findings of the previous tasks and develop candidate system strategies for providing cost-effective, shared, reliable mobile wireless communications. Needs that are impractical from a technology or cost viewpoint will be identified as such and eliminated from the design process.

One practical issue to be considered is that the time to reach technical obsolescence in communications technologies is becoming shorter every day. In light of these short cycles, the ability to incorporate periodic technology upgrades becomes critical to the ultimate life of a new system. In our experience, counties with the Consortium cannot easily keep pace with these upgrade cycles. Pressure for the Consortium to pool its resources will, therefore, continue to grow. Further, if the timing and technology choices for

these upgrades are made on a decentralized basis, the ability to maintain an environment of interoperability becomes almost impossible.

FE will project future wireless network requirements based upon both the information received from the relevant agencies and stakeholders of the 15-90 Consortium and upon the experiences of **FE** with other county and local government public safety mobile wireless projects within and external to of Montana. Changes in user requirements, traffic patterns and types, as well as wireless technologies will be projected over the next five years and the impacts on the design taken into account. The likelihood of change in specific operational, functional, and technical requirements will be called out where appropriate.

FE appreciates the budget realities facing most county and local governments today and clearly understands the need to protect existing investments. A fiscally responsible methodology must, therefore, be developed as a practical migration path to incorporate emerging technologies, and market innovations in both technology and funding.

In the course of formulating many such successful plans and designs, **FE** has found it most effective to follow the concept of "appropriate technology." By appropriate technology, we mean developing system recommendations that meets all of the important user requirements, including foreseeable expansion, while at the same time being realistically affordable by the user population. All too often we have seen unsuccessful mobile wireless network designs that were driven by other considerations:

- Technology driven designs, in which an attempt is made to acquire the most advanced technologies available, rather than proven technologies which users want and need
- Cost driven designs, in which only the lowest cost alternative receives serious consideration
- Vendor driven designs, in which systems are built around the approach discussed by the current vendor
- Politically driven designs, in which services are procured from the same suppliers as they have been in the past in order to achieve some essentially political end.
- "Ideal" designs that incorporate everyone's wishes and results in a system so expensive that it is never built.

In our experience, appropriate technology follows from a user-driven approach to system design. **FE** will, therefore, provide the Consortium with a set of recommendations providing systems configurations and associated cost estimates based heavily upon the user needs and reactions as determined through our needs assessment interviews, subsequent analysis, and ongoing, discussions with the Consortium and the relevant agencies and stakeholders.

FE will investigate alternative network architectures for satisfying the Consortium's requirements. **FE** will employ proven methodologies to assist in the decision process. Alternatives will be based on the following considerations:

- Needs of consortium participants individually and as a whole.
- Interoperability capabilities and capacity, now and anticipated for the future within the Consortium, with adjacent jurisdictions, and with the State
- Consortium system frequency spectrum requirements and availability in the VHF band
- Review of the previous Consortium system plans drafted to date
- Meets or exceeds the current functional capabilities offered by existing participants wireless communications
- Leverages existing county, local government, and State wireless communications assets where feasible as well as those new assets being deployed within Montana
- Uses technologies, services, and products that exist in today's marketplace but allows migration to emerging wireless technologies when user requirements and economics support migration
- Are practical from technical, economic, performance, regulatory, and frequency availability viewpoints

FE will recommend a mobile wireless infrastructure which will provide cost-effective, shared, reliable communications outlining the reasons for the recommendation. The system configurations will address Consortium networks, tower facilities, and infrastructure. Compatibility with existing facilities and equipment will be taken into account. **FE's** plan will be innovative and directed toward the Consortium's future public safety wireless needs and goals in a cost effective manner.

Analyses performed during this task, including cost estimates, will be high level in nature in order to weed out ineffective alternatives. Many factors affect this analysis, including such areas as costs, technology, regulatory issues, spectrum availability and operational issues. Because of work in similar programs, **FE** is intimately familiar with the current status and future trends affecting these factors.

3.9 Report Generation

Federal Engineering will prepare a draft outline of the Draft Design Recommendations and Budget Report and submit it to the Consortium Project Manager for review and approval. Upon approval of the outline, **FE** will begin generation of the report.

FE will generate and deliver six (6) copies of the Draft Design Recommendations and Budget Report and meet with the Consortium to review the recommendations. The Report will provide:

- ✓ the top-level design
- ✓ budgetary costs to procure and maintain the recommended systems
- ✓ training requirements
- ✓ a tentative implementation schedule

FE's report will also identify potential funding sources.

FE will incorporate the Consortium's comments and deliver six (6) copies of the Final Design Recommendations and Budget Report.

3.10 Grant Development Support (optional task)

Federal Engineering will assist the 15-90 Consortium and its members in pursuing a variety of funding sources including:

- Montana Interoperability Grant Sources
 - ▶ SIEC (State Interoperability Executive Council)
 - ▶ DES (Disaster Emergency Services)
 - ▶ Public Safety Services Office
- Department of Justice Grant Sources
 - ▶ COPS Interoperability Grants
- Department of Homeland Security Grant Process
 - ▶ Office of Domestic Preparedness Grants
 - ▶ State Homeland Security Grant Program
 - ▶ Law Enforcement Terrorism Prevention Program
 - ▶ Urban Area Security Initiative Grant Program

FE will provide the necessary technical input and can also provide grant development services should the Consortium desire.

4.0 PHASE II - PROCUREMENT SUPPORT (optional)

4.1 RFP Generation

There are a multitude of approaches to developing requirements and the resultant specifications for inclusion in an RFP (Request for Proposals). The risks and costs to the Consortium can vary significantly depending upon the approach taken. In this section of the proposal, we discuss several approaches and make recommendations as to the optimum methodology.

The "detailed design specifications" approach has been promoted in the past by several consulting firms. In this approach, a great deal of time, effort, and money are spent designing the system during the recommendations phase of the program. Theoretical coverage analyses are completed and verified by actual measurements in the field. Detailed equipment inventories are made and drawings depicting actual installation completed. New designs are then created with tradeoff analyses and rack level drawings. Equipment lists are then generated detailing specific systems and features. On the surface, this approach sounds very attractive because it generates very detailed equipment specifications which imply reduced risks to the Consortium. It also happens to generate a great deal of revenue for the consulting firm performing the work and confines vendor's creativity.

History has taught us, unfortunately, that just the opposite actually occurs. If the Consortium purchases a system via a detailed design RFP, the burden of risk immediately shifts from the equipment vendor to the Consortium. For example, by performing a detailed coverage analysis and selecting the sites for the vendor, the Consortium has accepted the burden for coverage. If the actual coverage is inferior, the vendor is not responsible since it was the Consortium who dictated the tower sites. Likewise, should an equipment compatibility issue arise, it is again the Consortium's problem since they called out specific equipment rather than leaving such issues to the vendor.

Detailed specifications are counter-intuitive. They are limiting in nature, stifle creativity and have just the opposite consequences as originally intended. Detailed specifications tend to drive up system costs significantly; innovation is suppressed, competition reduced, and the choice of equipment limited.

Federal Engineering is a strong proponent of a different approach to systems planning and procurement, one based on "functional requirements specifications." We have found, based upon many Consortium, local government, and state engagements, that this approach minimizes costs during the planning phase of the program, reduces the resultant overall system cost, and keeps the burden of risk on the equipment vendor where it, in fact, belongs. When this approach is used, the work performed during the planning phase is to document the functional and performance requirements of the Consortium. Coverage analyses may be performed to determine what the attainable coverage might be, to establish the number of new sites for budgeting purposes, and to serve as suggested new sites for the equipment vendors. It is presumed, however, that the equipment vendor will

perform their own coverage analysis thereby take responsibility for final coverage. Likewise, equipment lists generated during the planning phase are top level in nature, are used primarily for budgeting purposes, and are not intended to be a design.

FE will describe the functional and performance requirements of the mobile wireless infrastructure in sufficient detail for vendor's to submit consistent proposals and be verifiable through future acceptance testing. The actual detailed design of the system is left to the vendor. Some vendors refer to this approach as a "design-build" RFP. These requirements can be used during the procurement phase to serve as the foundation for the development of system acceptance criteria. However, the design of the acceptance test plan as with the design of the system will be left to the vendor. If the specifications are crafted properly, performance is tightly defined while at the same time encouraging competition and innovation.

It is impractical to determine details of the RFP until after the design recommendations have been developed. Once the recommendations are completed and accepted by the Consortium, **FE** will prepare a draft outline of the technical section of the RFP and submit it to the Consortium Project Manager for review and approval. Upon approval of the outline, **FE** will formulate the technical section of the RFP for inclusion in the Consortium's boilerplate terms and conditions. **FE's** RFP will be functional in nature to encourage a competitive bidding environment and ensure that the system supplier assumes the responsibility for detailed systems design.

FE's technical section will specify systems that are sufficiently robust to meet the Consortium's needs over the planning period and to readily incorporate new technologies as they emerge. It will also identify the potential implementation time frames, costs, and integration issues. **FE** will incorporate the Consortium Project Manager's comments and deliver a final technical section in both hard copy and electronic form. **FE** will also review the final version of the RFP to ensure that both the technical sections and the Consortium's "boiler plate" flow properly.

4.2 List of Potential Vendors

Federal Engineering will provide a list of potential vendors to the Consortium Project Manager for the purchase, installation, and implementation of the replacement systems. **FE** will use its past experiences to identify vendors who have successfully completed similar projects over the past three years. **FE** will also provide contact information within the vendors' organizations as to who should receive the RFP.

4.3 Procurement Support

FE will be available to assist the Consortium during the vendor pre-proposal meeting. **FE** will generate answers to vendors' written questions and will submit them to the Consortium for distribution to bidders. **FE** will also generate addenda to the RFP, if necessary, and submit them to the Consortium for distribution to bidders.

FE will develop, in consultation with the Consortium, evaluation criteria for determining vendor qualifications and capabilities, compliance with functional/technical specifications, and any other evaluation factors, as well as suggested relative weighting/scoring for those factors. This shall include evaluation models for determining the cost of vendor proposals.

FE will provide a mechanism for collecting and tabulating the Consortium's RFP evaluation committee members' scoring/rating of proposals. **FE** will train the Consortium's evaluation committee on the use of the mechanism and assist the Consortium in vendor proposal evaluations. **FE** will also recommend a program management and quality assurance approach to ensure that the procured system is implemented properly and according to specifications.

FE will attend vendor best and final presentations and document the results in the form of final vendor recommendations. **FE** will also attend vendor plant visits and demonstrations as necessary (plant visits are an optional task and not included in the pricing).

FE will assist the Consortium in the drafting of contract terms and conditions and be available to support vendor contract negotiations.

5.0 PHASE III - IMPLEMENTATION SUPPORT (optional)

Planning and implementing today's public safety communications networks cannot be left to chance. Many things can go wrong before management is aware and by that time, the project is already in trouble. The successful coordination of a multitude of vendors requires a rigorous methodology that is based upon years of experience and refinements. That is why numerous government organizations have made use of **FE** implementation support services.

In general implementation support includes:

- Coordinating tasks for all organizations functionally supporting a project
- Prioritizing all program activities
- Planning and coordination of support interfaces
- Preparation of a high level program plan and obtaining agreement from all concerned
- Continuous review and update of the plan and ensuring all obligations are fulfilled to the satisfaction of the Consortium
- Maintaining program documentation, controlling program variance from the plan, and reporting program status to the County Commissioners and other management as required.

Federal Engineering implementation support services take a project from the initially planning phases through implementation and testing. We will ensure that Consortium needs are met within the agreed upon schedule and for the projected budget. By involving **FE** early in a project, proper planning will take place before major commitments are made.

Most importantly, **FE** implementation support ensures the highest level of Consortium management visibility thereby eliminating virtually all “surprises” and creating a proactive management environment.

5.1 Program Management Office

Federal Engineering will maintain the Program Management Office described in Phase I throughout the Implementation Phase of this program. **FE**'s PMO will provide consistency and high visibility to Consortium management and system users.

5.2 Inventory Control

FE will establish an automated inventory control system for the Consortium and operate it during the implementation period. This system will track hardware and software providing both version and configuration control. The system will also track equipment status including location and conditions (e.g., active in the field, requires upgrade, return to the factory for warranty repair).

FE will interface with the vendor on staging activities, such as, site access and storage areas. **FE** will verify all on-site vendor hardware deliveries.

FE will train Consortium personnel at the end of the program to operate and maintain the equipment inventory database.

5.3 Quality Assurance

FE will implement detailed tracking, awareness, and coordination mechanisms for IVV (independent validation and verification). IVV deals with quality issues such equipment installation, performance verification, coverage measurements, as-built documentation, and acceptance testing.

5.3.1 Testing and Training

FE will review and approve all vendor testing procedures, radio coverage verification methodologies, acceptance test plans, transition/cut-over plans, and operational/maintenance training plans. **FE** will ensure that all the vendor supplied test plans provide sufficient test coverage and make recommendations accordingly.

FE will ensure that all proper procedures, documentation and manuals are provided before system testing commences. **FE** will provide on-site inspector(s) as needed to ensure that the installations are in accordance with the specifications, meet good workmanship practices, and are within equipment standards. **FE** will witness the initial system tests as the Consortium's representative. **FE** will generate punch lists as appropriate and participate in retesting to confirm that the deficiencies have been corrected.

5.3.2 System Acceptance

Final system acceptance will begin after the system tests have been completed, the fully functional system has been delivered, and the system is operating in parallel to the existing Consortium's systems. There will be a short-term burn-in period with vendor maintenance personal available on-site to correct discrepancies while the system is being operated by Consortium personal. During this period the main body of terminal (mobile and portable) equipment will be installed. Once all terminal equipment has been installed and accepted and all issues of non-compliance resolved, the new system will be considered fully accepted.

5.3.3 Documentation

FE will ensure the delivery of any and all manuals appropriate to the installed equipment and systems. **FE** will ensure that corrections have been made by the vendor to all final manuals after final system acceptance testing and all discrepancies corrected. As-built drawings as well as electronic forms of the documentation will be verified via audits.

5.4 Training

FE will review user, dispatch, maintenance, supervisor, and system administrator training and suggest additional training if required. **FE** will monitor all training activities to make sure groups have been sufficiently trained before the system goes active. Post mortem analyses of the negative experiences of other governments that have made the transition from older analog systems to modern digital systems have highlighted the need for adequate training before usage begins.

6.0 DELIVERABLES AND MILESTONE SCHEDULE

FE will complete the proposed program in accordance with the following schedule assuming contract execution and notice to proceed is received on or before November 1, 2004:

Deliverables / Milestones	Weeks ARO
Program Initiation	1
Deliver list of information required to Consortium	2
Project Orientation Meeting with the Consortium	3
Develop detailed interview schedule with the Consortium	3
Site visits begin	4
Interview questionnaire submitted to the Consortium	4
Final detailed project plan and FEClientNet structure	4

Deliverables / Milestones	Weeks ARO
Begin interviews with participating agencies	5
Receive completed Information Requests from participants	6
Coverage analysis begins	7
Site visits completed	8
Interviews with participating agencies completed	8
Coverage analysis completed	10
Draft Needs Assessment Report delivered to Consortium	11
Meeting with Consortium to review report	12
Final Needs Assessment Report delivered to Consortium	13
Draft Outline of Design Recommendation Report delivered to Consortium	14
Consortium Comments received	14
Final Outline of Design Recommendation Report delivered to Consortium	15
Draft Design Recommendation & Budget Report delivered to Consortium	19
Meeting with Consortium to review report	20
Final Design Recommendation & Budget Report delivered to Consortium	22
Status Reports	Bi-weekly

The above schedule is tentative and can be modified should the Consortium desire. This schedule is heavily dependant upon timely participation by the Consortium's members and can be impacted by weather conditions.

FE will provide six (6) printed copies of all interim, draft, and final reports. Should the Consortium desire, the deliverables can be accompanied by electronic copies in the form of CD-ROMs. These can be provided in either Corel WordPerfect®, Microsoft Word®, or Adobe Acrobat® formats at the choice of the Consortium. Presentations can be provided in either Corel Presentation® or Microsoft PowerPoint®. Election of one format must be made at the beginning of this program. It shall be the responsibility of the Consortium and its participants to ensure compatibility with their respective word processing and other computer systems.

7.0 Fee Proposal

Federal Engineering will perform the work called out in Section 3 (excluding optional tasks) on a firm-fixed-price basis for a lump sum cost of \$194,810. which includes \$160,200 in labor costs and \$34,610 in travel and other direct costs. Pricing by task is as follows:

Task	Price
Needs Assessment	\$120,230
Plan and Recommendations	\$ 57,300
Coverage Analysis	\$ 17,280

FE envisions eleven (11) equal biweekly invoices in the amount of \$17,710 each.

7.1 Labor Estimates

This statement of work will be performed on a firm-fixed-price basis in accordance with the pricing called out in Paragraph 7 above. The following estimated labor hours for the work called out in Section 3 (excluding optional tasks) are for informational purposes only:

Labor Category	Total Hours
Principal	80
VP/Chief Consultant	200
Senior Consultant	1,000
Consultant	160
Admin/Computer Support	176

The **FE** program manager reserves the right to adjust the distribution of hours among consultants to meet our commitments to the Consortium.

7.2 Assumptions and Constraints

This proposal assumes Federal Engineering, Inc. will perform all of the tasks as called out in Sections 3 (excluding optional tasks). The deletion of a task or significant change in scope of one or more tasks may affect the overall price.

The proposal assumes that the Consortium's Project Manager will schedule meetings, notify attendees, arrange for on-site visits, provide local transportation within Montana, duplicate documents, and distribute the documents to participants. This proposal also assumes that the Consortium will, at no cost to **FE**, make an office available for the use of **FE** consultants for the duration of the project including:

- customary office arrangements and supplies
- connection to the Internet and email access
- local telephone service with voice mail
- access to conference room as needed
- access to secretarial support for messages and other administrative support

Locating **FE** consultants in a Consortium provided office while they are in town is for the convenience of Consortium personnel and to facilitate a close working relationship. However, should the Consortium find any of these office requirements of concern, **FE** will be happy to adjust its proposal accordingly and delete these requirements at no additional cost to the Consortium.

FE's ability to fulfill this task depends, in part, on the willingness and ability of Consortium, Consortium participants, equipment vendors, service providers, third parties, and others to provide information in a timely manner, and upon the accuracy of the information as supplied. The accuracy of input data, whether provided in electronic or hard copy form, and the recommendations, actions, system designs, procurements, and bidder actions resulting therefrom cannot, therefore, be warranted by **FE** nor can the performance, suitability, or reliability of said systems be warranted by **FE**.

This proposal is based upon 8 person-trips to the Consortium and assumes a maximum of 22 weeks from notice to proceed to the completion of the last milestone. Delays to the program schedule due to actions or lack of actions on the part of Consortium, Consortium participants, equipment vendors, service providers, third parties, and others as well as vendor protests and other procurement related actions may result in additional costs and will be brought to the attention of Consortium's Project Manager in a timely manner.

Submitted by **FE**:

John E. Murray, Sr. Vice President
October 12, 2004

Ronald F. Bosco, President
October 12, 2004

Authorization to begin work by the
15-90 Consortium:

(Signature)

(Printed name and title)

(Date)